

From: [Jeff Baker](#)
To: [Chris Thompson](#); [Eric Blischke/R10/USEPA/US@EPA](#); [jeremy_buck@fws.gov](#); [Joe Goulet/R10/USEPA/US@EPA](#); [Jennifer L Peterson](#); [Burt Shephard/R10/USEPA/US@EPA](#); [Robert.Neely@noaa.gov](#); [rgensemer@parametrix.com](#); [Ron.Gouguet@noaa.gov](#)
Cc: [cunninghame@gorge.net](#); [Stephen Kelly](#); [erin.madden@gmail.com](#); [stanv@ctsi.nsn.us](#); [tomd@ctsi.nsn.us](#); [wbarquin@hk-law.com](#); [Audiehuber@ctuir.com](#); [Patti Howard](#); [Valerie Lee](#); [Aron Borok](#); [Kelly Dirksen](#); [Pete Wakeland](#)
Subject: RE: Information for the Lamprey Tox Testing Agenda Item
Date: 11/08/2006 01:30 PM

Eric and = Chip,

After the TCT discussion this = morning regarding ammocoete range finding I want to make it clear that the Confederated = Tribes of Grand Ronde objects to beginning the range finding tests in the absence = of a complete experimental study design and data quality objectives to = address the appropriate water temperature for testing.=A0 I am not opposed to running tests at = different temperatures but there needs to be an analysis of what temperatures may be = appropriate before the tests are run, not after the initial run is finished.=A0 The = Grand Ronde does not agree to the use of 12 degrees C as a starting point for = the reasons layed out by Chris Thompson of EI and I find it disturbing that = the decision does not appear to have been based on the science available in = peer reviewed journals.=A0 In addition ammocoetes in streams are routinely = exposed to varying temperatures between night and day which would indicate they = could adjust to different temperatures in the lab.=A0 Please feel free to call = contact me if you have any questions.

Jeff

From: Chris = Thompson [mailto:chris.thompson@EILTD.net]
Sent: Tuesday, November = 07, 2006 3:07 PM
To: = Blischke.Eric@epamail.epa.gov; jeremy_buck@fws.gov; Goulet.Joe@epamail.epa.gov; [Jennifer L Peterson](mailto:Jennifer.L.Peterson@epamail.epa.gov); Shephard.Burt@epamail.epa.gov; Robert.Neely@noaa.gov; = rgensemer@parametrix.com; Ron.Gouguet@noaa.gov
Cc: Jeff Baker; cunninghame@gorge.net; Stephen = Kelly; erin.madden@gmail.com; stanv@ctsi.nsn.us; tomd@ctsi.nsn.us; wbarquin@hk-law.com; = Audiehuber@ctuir.com; [Patti Howard](mailto:Patti.Howard@epamail.epa.gov); = [Valerie Lee](mailto:Valerie.Lee@epamail.epa.gov); [Aron = Borok](mailto:Aron.Borok@epamail.epa.gov)
Subject: Information for = the Lamprey Tox Testing Agenda Item

Hi All,

On October 30, I sent you all an e-mail regarding the = question: What is the most appropriate temperature at which toxicity testing of = lamprey ammocoetes should be conducted in the lab? I asked that this be = placed on the agenda for

tomorrow's TCT call; as a result, I thought I would = share this email with you regarding the issue so that we can have a more = productive discussion in the TCT. Among other things, I have addressed the = issues raised in Helle's email to Eric regarding the appropriate = temperature for toxicity testing of lamprey.

The FSP for the lamprey toxicity testing states that testing = will be done at 12=B0C (=B1 1=B0C). My concern is that this temperature is inappropriate, and that a warmer temperature (16=B0-17=B0C) is more appropriate. This is based on a wealth of literature, basic = principles of fish physiology, thermal conditions in the Willamette River, and advice from a lamprey expert, Mike Meeuwig (who did research on = lamprey for USGS) who has a wealth of experience maintaining ammocoetes in the = lab. More specifically the basis for my conclusion that the tests should be conducted at 16=B0-17=B0C are as follows. =

1. It makes sense to consider toxicity at temperatures experienced in the environment where organisms are exposed = to contaminants, and at which their exposure will be the greatest. = Because lamprey are "cold-blooded" their metabolic rate will be = higher at 16=B0-17=B0C than at 12=B0C, and they will physiologically process more = contaminant at the higher temperature. For this reason alone, it makes sense = to have toxicity testing at 16=B0-17=B0C than at = 12=B0C.

2. Temperatures to which lamprey are exposed = in the lab should be temperatures within the range of temperatures actually experienced by lamprey in the Willamette River. = Lamprey ammocoetes are exposed to temperatures in the lower Willamette River = from May through October ranging from a minimum of 15=B0C to a maximum of = nearly 22=B0C, i.e., much higher than 12=B0C (see Figures 1 and 2 below). = Thus, a temperature of 16-17=B0C is far more representative than is 12=B0C of = the temperature conditions in the Willamette River experienced by ammocoetes = during the months in which they are active (i.e. not hibernating in the = sediment).

3. One reason that one might not want to test = lamprey at the higher temperature is if that temperature, in the absence of contaminants, could adversely affect the ammocoetes. However, = there is no indication that lamprey held in the lab at 16=B0-17=B0C are compromised = in any way. When maintained in a clean laboratory medium, in the absence = of contamination, lamprey ammocoetes survive equally well at 10=B0C, = 14=B0C, and 18=B0C. This was the result of research by Michael Meeuwig on the = tolerance of lamprey ammocoetes to exposure to different temperatures. See = first paragraph of

Mike's email below.

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River Mile

Figure 1: Monthly Average Temperature Longitudinal Profiles in the Willamette

Figure 2: Temperature profiles in the middle of the Willamette River at Waverly Country Club, RM 17.9

The LWG's choice of 12=B0C as the temperature at which to = conduct toxicity tests on ammocoetes was based on a rationale that is not = technically supported. The LWG provided three reasons to EPA for why they = selected 12=B0C in an October 27, 2006 email from Helle Andersen of Windward to = Eric Blischke. More specifically the rationale presented in = Helle's email and the errors in it are as follows. =

1) Helle states, first, "The temperature in the holding = aquaria was selected based on a conversation with Mike Meeuwig, previously = employed by USGS, who indicated that temperature above 15=BAC may increase = mortality."

As Mike Meeuwig's email to me states, = his work shows no difference in survivorship and other important factors of = health when maintaining ammocoetes in the lab in a clean medium (clean water in the = holding tank) within a temperature range of 10=B0C to 18=B0C. = Reduced survivorship at 16-17=B0C is not true and, thus, is not a reason for = deviating from the logical selection of 16=B0-17=B0C. =

2) Second, Helle states: "Another reason was that rainbow = trout testing is performed at 12=BAC. Rainbow trout is in general regarded one = of the most sensitive species, so performing the lamprey ammocoete tests at the = same temperature would facilitate a comparison." =

As we have discussed at length, lamprey are = dissimilar to trout. Thus, the experience with trout is largely irrelevant to = the appropriate temperature at which to conduct toxicity tests on lamprey ammocoetes. Moreover, results from a 12=B0C test are likely to = understate toxicity of contaminants that ammocoetes would experience in the = Willamette.

3) Lastly Helle notes: "Finally, the temperature in = Siletz = River is currently around 12=BAC."

This fact is irrelevant to the selection of appropriate toxicity testing for ammocoetes. As noted above, we should = be striving to test a temperature that is experienced in the Willamette. Moreover, as noted above, the metabolic rate will be higher at = 16=B0-17=B0C than at 12=B0C and they physiologically process more contaminant at the higher = temperature. Moreover, Mike Meeuwig has explained to me that there is no problem = acclimating ammocoetes collected at 12=B0C to 16=B0-17=B0C. Further as = the above graphs demonstrate temperatures to which ammocoetes are subjected in the = Willamette during the months of May-October are = generally significantly higher than this. For example, the average = temperature in July is 21-22=B0C.

I encourage EPA to give careful consideration to requiring that = the LWG maintain and test ammocoetes at a temperature of 16=B0-17=B0C. The = upshot is that it makes little sense to spend precious dollars on toxicity testing = with a design that is suboptimal. Moreover, even if the LWG were to = propose conducting tests at

two temperatures, we still have concerns. In a budget limited context, which we have here, the 12=BOC tests simply reduce the number of tests that could be conducted at a far more appropriate temperature. Hence it makes little sense to conduct 12=BOC tests at all. =

I hope the foregoing information is helpful for the discussion = in the TCT meeting and we look forward to talking about this at the meeting on Wednesday.

Chris

From: Meeuwig, Michael [mailto:mmeeuwig@montana.edu] =

Sent: Monday, October 30, 2006 9:46 = AM

To: Chris Thompson

Subject: RE: lamprey ammocoete thermal = preferences

Chris Thompson;

Based on our data it seems that any temperature from 10 to 18 = degrees C should be adequate for holding Pacific lampreys during your study. Although we did have highest survival at 18, the differences between 10, = 14, and 18 were so small that they likely do not indicate a substantial effect. I must add that our work was with early stage larvae so extrapolation to older life stages should be done with = caution.

We have held ammocoetes in the laboratory for multiple years at seasonally variable temperatures up to, and exceeding 15 C; these = animals appear to be fairly robust up to a point.

It seems to me that if these toxicity tests are intended to be applicable to the Portland Harbor Superfund site there really should be = some basis for temperature choice (e.g., temperatures experienced in the = Portland Harbor Superfund site). I do not know a lot about toxicology, but = it seems that with increasing temperature, and therefore metabolic rate, = the rate of uptake of the toxins could change and potentially have a significant = affect on your results. I realize that the EPA often has standard = protocols, but perhaps since you are dealing with a) a species that

may not have had = these types of test done, and b) you are applying the data to a specific site, = there may be a chance to institute a more comprehensive and rigorous study design. Is there any way you could convince the Lower Willamette = Group to add a couple of treatments (e.g., tests at minimum and maximum mean (or = median) daily temperatures experienced in this area (also mid-point?) as well as controls at these temperatures)? I understand this may not be = realistic in terms of funding, but it may not be that realistic to stick with 12 C without any basis.

Bottom line, I would say that there should not be any = significant mortality associated with acclimation and test temperatures between 10 = to 18 degrees C based on the available literature (i.e., survival should be = high for control animals), but that there may be unknown interactive, = synergistic, or additive effects of temperature and = contaminants.

Sorry I could not give you a "silver bullet" = temperature to use, but I really think these types of things are more complicated than = that so I will have to go with the available data.

Thanks,

Mike

Michael H. Meeuwig

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-----Original Message-----

From: Blischke.Eric@epamail.epa.gov = [mailto:Blischke.Eric@epamail.epa.gov]

Sent: Monday, October 30, 2006 9:16 AM

To: jeremy_buck@fws.gov; Goulet.Joe@epamail.epa.gov; Jennifer L = Peterson;
Shephard.Burt@epamail.epa.gov; Robert.Neely@noaa.gov; Chris Thompson;
rgensemer@parametrix.com; Ron.Gouguet@noaa.gov

Subject: Fw: Response to lamprey toxicity testing FSP = comments

FYI

----- Forwarded by Eric Blischke/R10/USEPA/US on 10/30/2006 = 08:55 AM

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Chip and Eric,

Thank you for your letter of October 13, 2006 that provided = comments to the Round 3 Lamprey Ammocoete Toxicity Testing Field Sampling = Plan. LWG has reviewed all the comments and is submitting the following = response.

LWG agrees that rigorous "methods" for the = collection, transport, and holding of the lamprey ammocoetes will not be developed during = Phase 1.

Instead useful information will be learned which will be applied = to the

Phase 2 toxicity testing. As communicated by Chip last Friday, = LWG

understands that EPA and its partners no longer request = additional

lamprey ammocoetes to be collected for tissue chemistry = analysis. The

field crew is therefore not collecting ammocoetes for tissue = analyses;

however, a sub-sample of approximately 20 individual ammocoetes = will be

archived for future taxonomic identification if = necessary.

Additional notes on site conditions are currently being taken by = the

field crew. The majority of the ammocoetes has been collected at = a

specific site recommended by Stan Van De Wetering. Water = temperature in

the Siletz River during = collection has been above 12=BAC and the number of

ammocoetes targeted for Phase 1 was met on 10/24/06. The = laboratory (NAS) requested a total of 360 individual ammocoetes to conduct = the six range-finding tests. Initially, about 500 individuals were = targeted for the field collection. However, because a relatively large size = range was seen in the ammocoetes and to ensure that enough ammocoetes = were collected to meet any future request from EPA and its partners = (i.e., archiving ammocoetes for taxonomic identification) 800 = ammocoetes were collected in the field (the maximum number allowed based on = the Scientific Taking Permit). This will give NAS a better selection = of ammocoetes to pick from at test initiations. The size and weight = of a subsample of ammocoetes have been measured at NAS. The sizes = ranged from 28 mm to 84 mm and from 0.04 g to 0.78 g. Based on these = measurements and observation of the remaining ammocoetes NAS is planning to = use ammocoetes in the middle of the size range for the = range-finding tests.

LWG agrees that a key aspect of the toxicity testing program is = the successful holding of the lamprey ammocoetes. NAS and = Windward have therefore contacted numerous scientists from USGS, USFW, ODFW, = the Siletz and others familiar with the holding of lamprey = ammocoetes. In addition, members of NAS went and talked with Christina Luzier, = USFWS biologist, in person to discuss her holding methods. The = lamprey ammocoetes currently at NAS are being closely monitored. = Temperature, dissolved oxygen, and ammonia are measured daily and the first = round of weight and length measures was performed 10/23/06. Mortality = rate has been very low. Three ammocoetes out of 270 individuals have died = in the laboratory after about one week; two of these arrived at the = laboratory in weak condition. In general, NAS is reporting that the = ammocoetes look

very healthy. The hardness of the water was selected for three reasons: as EPA pointed out in their letter, the water hardness in Willamette River is soft, the water in the Siletz River is also soft, and the majority of the fish studies used for deriving AWQCs was performed in soft water. Because only limited hardness data is available from the Siletz River, hardness has been analyzed by NAS in water samples collected by the field crew at the ammocoete collection sites. The holding and testing water is dechlorinated City of Newport water with an adjusted hardness of $< 50 \text{ mg/kg CaCO}_3$ and no problems have been observed during transition of the ammocoetes from site collected water to holding water.

The temperature in the holding aquaria was selected based on a conversation with Mike Meeuwig, previously employed by USGS, who indicated that temperature above 15°C may increase mortality. Another reason was that rainbow trout testing is performed at 12°C . Rainbow trout is in general regarded one of the most sensitive species, so performing the lamprey ammocoete tests at the same temperature would facilitate a comparison. Finally, the temperature in Siletz River is currently around 12°C . However, LWG has initiated talks with NAS about performing one or two range-finding tests at two different temperatures (12°C and 18°C) (pending sufficient ammocoetes) in Phase 1. The transportation substrate (sterile sand) was recommended by Stan Van De Wetering. However, after talking with other fishery biologists including Christina Luzier, the substrate was changed to site-collected sediment. LWG is looking forward to continued communications with EPA and its partners about the lamprey ammocoetes toxicity testing.

Helle B. Andersen

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This communication is made under the framework of the LWG = Participation Agreement and in the parties' common interests in meeting LWG = member obligations under the Administrative Order on Consent and = in anticipation of litigation concerning liability for the = Portland = Harbor Superfund site. This communication is intended and believed by = the parties to be part of an ongoing and joint effort to develop = and maintain a common legal strategy and contains strategies, work = product and legal advice within the "common interest" = extension of the attorney-client privilege and the work product doctrine. = This communication may include attorney-client communications. With = respect to communications by private LWG members to public members, = those communications are with the expectation that they will be = kept confidential by the public entities. The information is intended = to be for the use of the individual or entity named above. If you are = not the intended recipient, please be aware that any disclosure, = copying, distribution or use of the contents of this information is = prohibited. If you have received this electronic transmission in error, = please

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